Oracle Sharding Demonstration

Linear Scalability and Extreme Data Availability
Oracle Sharding Demo on Oracle Bare Metal Cloud

• Objectives
  – Demonstrate linear scalability of Relational transactions
  – Showcase highest availability with MAA on Oracle Bare Metal Cloud

• Infrastructure
  – Each shard hosted on dedicated server

<table>
<thead>
<tr>
<th>Component</th>
<th>Resources per shard</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU</td>
<td>36 Cores</td>
</tr>
<tr>
<td>Memory</td>
<td>512 GB</td>
</tr>
<tr>
<td>Flash</td>
<td>12.8 TB NVMe</td>
</tr>
<tr>
<td>Network</td>
<td>10 GbE</td>
</tr>
</tbody>
</table>

Demo Topology

Availability Domain 1
(100 Primary Shards)

Shard-level Active Data Guard (Max Availability)

Availability Domain 2
(100 HA Standby Shards)
Sharding – a Different Way to Scale

Frictionless linear scaling due to zero shared hardware or software

![Graph showing TPS vs. number of shards](attachment://graph.png)
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Conclusions

• Elastically scaled-out to 200 shards on Oracle Bare Metal Cloud
  – Demonstrated linear scalability of Relational transactions
  – Demonstrated 11 Million transactions per sec that includes:
    • 4.5 Million Read-Write Transactions per sec across all 100 Primary shards
    • 6.5 Million Read-Only Transactions per sec across all 100 Active Standby shards

• MAA Sharding provides highest availability
  – Each shard is protected by Data Guard Fast-Start Failover across Availability Domains
  – Single Shard Failure resulted in 100% availability for 99% of the application
    • 1% of the application experienced only 15 seconds blackout
Shard Catalog Outage Testing

Shard Catalog Outage Has Zero Impact on Availability for OLTP

- Outage of shard catalog has no effect on application performance (Direct Routing)
- Ranges of sharding keys are cached within the connection pools
- OLTP Transactions use direct routing, completely bypassing the shard catalog
- MAA Best Practice is to protect catalog with Data Guard Maximum Availability
Shard Directors Outage Testing

Shard Director Outage Has Zero Impact on Availability

• Outage of shard directors does not affect a running connection pool
• Connection pool caches ranges of sharding keys / shards
• MAA best practice to have 3 shard directors per region
Shard Outage has Zero Impact on Surviving Shards
Each Shard is a Physically Separate Oracle Database

Application remains available on other shards

Automatic failover quickly restores service for the shard impacted by outage